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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/262,000	03/05/1999	SIK ON KONG	CS98-076	8744

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EXAMINER
VOCKRODT, JEFF B

ART UNIT	PAPER NUMBER
2822	

DATE MAILED: 05/08/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/262,000	Applicant(s) KONG ET AL.	
	Examiner Jeff Vockrodt	Art Unit 2822	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 January 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *8,14-16,18-23,25-28,30-32 and 38-40* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *8,14-16,18-23,25-28,30-32 and 38-40* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

This office action is in response to the amendment filed on December 25, 2002. Claims 8, 14-16, 18-23, 25-28, 30-32, and 38-40 are pending.

Claim Objections

Claims 8, 14-16, 18-23, 25-28, 30-32, and 38-40 are objected to because of the following informalities:

The underlined portion of the clause "depositing optical interference layers of silicon oxide or silicon nitride or silicon oxide or silicon nitride" is superfluous. During a phone interview with Stephen Ackerman on April 24, 2003, it was agreed that "layers of silicon oxide or silicon nitride" was intended. Applicant should delete the underlined portion from each claim where it occurs.

Claims 14, 18-20, 23, 25, and 30 fail to comply with 37 C.F.R. §1.75(d)(1). The claimed subject matter lacks antecedent basis in the specification.

Claim 30 is unclear, "between about 0.1 and 5 microns posts to achieve" is not understood.

Claims 19, 20, and 23 depend from claim 38 and each make reference to elements not in claim 38.

Claims 26, 27, and 28 depend from claim 39 and each make reference to elements not in claim 39.

Claims 31-32 depend from claim 40 and each make reference to elements not in claim 40.

The examiner requests clarification of the dependent claims to clarify how they further limit the independent claim. For instance, claim 14 states "The method of claim 8 for forming . .

.", and should read "The method of claim 8 further comprising: forming . . . " The examiner invites such clarification.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following are quotations from the first and second paragraphs of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.
>
> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 8, 14-16, 18-23, 25-28, 30-32, and 38-40 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claims 8, 14-16, 18-23, 25-28, 30-32, and 38-40 (independent claims 8, 38, 39, and 40) are notable in that there is no support in the original disclosure for performing their steps in the order that they are written in the claim. This new matter found its way into the disclosure at the time the dependent claims were incorporated into independent claims in the most recent amendment. While it is true that claims are given their broadest reasonable interpretation in the patent office and that method claims are not necessarily limited to the order that their steps are written, there is nothing here to warrant such a broad claim interpretation. Claim 38 is exemplary, the relevant portion being reproduced below (emphasis added):

> removing said third metallic layer not covered by said photoresist mask, forming said alignment post by the process of insulation material by lift-off upon said optical interference layer OIL;
> removing said photoresist mask to provide that each said pixel retains said third metallic layer, which shall act as a mirror reflector for light incident upon said liquid-crystal-on-silicon display device; and

depositing optical interference layers of silicon oxide or silicon nitride or silicon oxide or silicon nitride over said third metallic layer and said silicon dioxide layer.

The most natural reading of claim 38 (corresponding to the subject matter described in Figs.14-17 and the description commencing at page 12 of the specification) would require that the alignment post be formed while the third metallic layer is covered by the photoresist mask. There is no written description to support this reading. The overall structure in which the claims are drafted consists of a sequential listing of method steps, set off by semicolons, and listed generally in the order in which they are performed in the closest disclosed embodiment. The disputed language is appended to one of these steps, clearly suggesting that regardless of the order in which other steps are performed, that forming the alignment post should be done just after the metallic layer not covered by the photoresist mask is removed. Of course, this would imply that the interference layers were formed after (and consequently over) the alignment post. There is no support for this in the written description. This deficiency is present in all of the independent claims and may be cured by rewriting the claim so that the matter previously incorporated from the respective dependent claim is appended in a separate clause to the end of each respective claim.

The examiner anticipates that applicant will make the suggested amendment, and will examine this case with respect to prior art as though that amendment had occurred in order to advance prosecution.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 39 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Pat. No. 6,027,999 ("Wong") in view of U.S. Pat. No. 6,124,912 ("Moore") and U.S. Pat. No. 6,266,121 ("Shigeta").

Wong teaches a method of forming a reflective LCD that positions a LCD standoff on a passivation layer that covers the reflective surface comprising the steps of:

providing a silicon wafer 10 having a pattern of active device structures therein and thereon;

forming a first metallic layer 20 over the said silicon oxide 18 (this limitation lacks antecedent basis);

forming a second metallic layer 32 over the said silicon oxide 24, which is used both for connections 32 and for bonding pads 30;

forming a silicon oxide insulation 36 over the said second metal layer 32;

forming a third metallic layer 42 over the surface of said layer of silicon dioxide 36;

forming a photoresist mask (not shown) over the said third metallic layer 42 having a covering over the planned pixel locations 42 of the said liquid-crystal-on-silicon display device;

removing the said third metallic layer not covered by the said photoresist mask (not shown);

removing the said photoresist (not shown) mask to provide that each said pixel retains said metallic layer 42, which shall act as a mirror reflector for the light incident upon said liquid-crystal-on-silicon display device; and

depositing a passivation layer on the pixels 42.

Wong differs from the claimed invention by not teaching depositing optical interference layers of silicon oxide/silicon nitride/silicon oxide/silicon nitride over said third metallic layer 42 and said silicon dioxide layer 36.

Moore teaches an improvement on reflective LCDs that have a passivation layer above a reflective pixel layer wherein the passivation layer is replaced with a layer of silicon oxide 233 /silicon nitride 232 /silicon oxide 231 /silicon nitride 230 over the reflector and the oxide layer that underlies the reflector. This quarter wave stack having four dielectric layers creates constructive interference which increases the reflectance of the pixel. Moore, col. 3, ll. 32-42.

It would have been obvious to one of ordinary skill in the art at the time of the invention to replace the passivation layer of Wong with the quarter wave stack of Moore to increase the reflectance of the pixel as taught by Moore.

Claim 39 differs from the collective teaching of Wong and Moore by requiring "forming said alignment post by the process of insulation material by lift-off upon said optical interference layer OIL." Shigeta teaches forming spacers (76) on top of insulating layers (73,74) overlying electrodes in a LCD device using a lift-off process. Specifically, photoresist (75) is deposited on the insulating layer (74) and patterned to form voids (83) (Fig. 23(b)). Shape memory polyurethane is deposited in the voids (83) and the photoresist (75) is removed (lifted-off) to leave spacers (76) at patterned locations (Fig. 23(c)). One of ordinary skill in the art would recognize that Shigeta's process allows precise placement of spacers on a substrate relative to electrodes and enables formation of spacers out of particular materials.

It would have been obvious to one of ordinary skill in the art at the time of the invention to use a lift-off patterning process in the process of Wong and Moore to allow for precise placement of spacers on the substrate relative to the electrode and enable formation of spacers out of particular materials as suggested by Shigeta.

Claim 40 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Pat. No. 6,027,999 ("Wong") in view of U.S. Pat. No. 6,124,912 ("Moore"), U.S. Pat. No. 4,763,995 ("Katagiri"), and U.S. Pat. No. 6,449,024 ("Hirakata").

Wong teaches a method of forming a reflective LCD that positions a LCD standoff on a passivation layer that covers the reflective surface comprising the steps of:

providing a silicon wafer 10 having a pattern of active device structures therein and thereon;

forming a first metallic layer 20 over the said silicon oxide 18 (this limitation lacks antecedent basis);

forming a second metallic layer 32 over the said silicon oxide 24, which is used both for connections 32 and for bonding pads 30;

forming a silicon oxide insulation 36 over the said second metal layer 32;

forming a third metallic layer 42 over the surface of said layer of silicon dioxide 36;

forming a photoresist mask (not shown) over the said third metallic layer 42 having a covering over the planned pixel locations 42 of the said liquid-crystal-on-silicon display device;

removing the said third metallic layer not covered by the said photoresist mask (not shown);

removing the said photoresist (not shown) mask to provide that each said pixel retains said metallic layer 42, which shall act as a mirror reflector for the light incident upon said liquid-crystal-on-silicon display device; and

depositing a passivation layer on the pixels 42.

Wong differs from the claimed invention by not teaching depositing optical interference layers of silicon oxide/silicon nitride/silicon oxide/silicon nitride over said third metallic layer 42 and said silicon dioxide layer 36.

Moore teaches an improvement on reflective LCDs that have a passivation layer above a reflective pixel layer wherein the passivation layer is replaced with a layer of silicon oxide 233 /silicon nitride 232 /silicon oxide 231 /silicon nitride 230 over the reflector and the oxide layer

that underlies the reflector. This quarter wave stack having four dielectric layers creates constructive interference which increases the reflectance of the pixel. Moore, col. 3, ll. 32-42.

It would have been obvious to one of ordinary skill in the art at the time of the invention to replace the passivation layer of Wong with the quarter wave stack of Moore to increase the reflectance of the pixel as taught by Moore.

Claim 40 differs from the collective teaching of Wong and Moore by requiring "forming said alignment post by a process of polyimide by photosensitive etching upon an Optical Interference Layer (OIL)." Katagiri teaches that pillar or wall shaped spacers formed over insulating layers and electrodes were known to be made from photosensitive polyimide (col. 7, ll. 40-60). Hirakata (cited to show how to pattern the photosensitive polyimide of Katagiri) teaches patterning photosensitive polyimide into spacers (Fig. 7B) using a photosensitive etching technique whereby photolithographic exposure of the polyimide changes the solubility of the polyimide (col. 18, ll. 57-64). One of ordinary skill in the art would recognize that using photosensitive polyimide eliminates one step from the conventional depositing of depositing a patterning material and a photoresist on the patterning material.

It would have been obvious to one of ordinary skill in the art at the time of the invention to form the alignment post (spacer) by a process of polyimide by photosensitive etching upon an Optical Interference Layer (OIL) such as taught by Moore in the process of Wong and Moore. One of ordinary skill in the art would have been motivated to form spacers from photosensitive polyimide in this manner to reduce the number of manufacturing steps.

Conclusion

Any inquiry concerning communications from the examiner should be directed to Jeff Vockrodt at (703) 306-9144 who can be reached on weekdays from 9:30 am to 5:00 pm EST. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian, can be reached at (703) 308-4905.

The fax numbers for this Group are (703) 305-3432, (703) 308-7722, (703) 305-3431, and (703) 308-7724. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist at (703) 308-0956.

May 2, 2003
J. Vockrodt

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